

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS: Walter Bernig et al.
Application NO.: 10/523,130
FILED: 24 August, 2005
FOR: Film comprising a gas barrier layer

DECLARATION UNDER 37 C.F.R. § 1.132

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir,

I, Bernig Walter, hereby declare as follows:

1. I am a citizen of Germany, residing at Am Weiher 57B, D-87471 Durach
2. I studied chemistry at the Fachhochschule of Aalen and received a degree in the field chemical engineering in the year 1977.
3. Since April 1, 1987 I have been employed as a project engineer/manager R&D in the field of Research and Development of films for deep draw applications and shrink bags and I am still working in this field for the company CFS Kempten GmbH, Kempten, Germany.
4. I am one of the inventors of the invention disclosed in the U.S. patent application Serial No. 10/523,130.
5. The following experiments were conducted under my supervision and control:

A film with the following layer structure:

- a) an outer layer,
- b) a coupling agent layer,
- c) an O₂ barrier layer,
- d) a coupling agent layer and
- e) a heat-sealing layer as an outer layer,

was produced by the coextrusion blown film process and was drawn 1:3.3 in the longitudinal direction and 1:3.5 in the transverse direction.

Total film thickness was 55 µm. The thicknesses of the individual layers were: 10 µm for the outer layer a), 8 µm for the coupling agent layer b), 6 µm for the O₂ gas barrier layer c), 16 µm for the coupling agent layer d) and 15 µm for the heat-sealing layer e).

The materials used for the individual layers were:

for the outer layer a) a mixture of 56 wt.% of an EVA, 40 wt.% LLDPE and 4 wt.% antiblocking agent,

for the coupling agent layer b) a mixture of 50 wt.% of a maleic anhydride-modified EVA and 50 wt.% LLDPE,

for the O₂-barrier layer c) a mixture of EVOH with 44 mol% ethylene and a multipolyamide in a ratio by weight of EVOH to multipolyamide of 30:70,

for the coupling agent layer d) a mixture of 50 wt.% of a maleic anhydride-modified EVA and 50 wt.% LLDPE,

for the heat-sealing layer e) a mixture of 78 wt.% EVA, 20 wt.% LLDPE and 2 wt.% antiblocking agent and slip agent.

The O₂ gas permeability values of the film thus produced at a relative humidity of 0% and of 85% are shown in Table 1, wherein the measurements were performed in accordance with ASTM D3985.

The O₂ gas permeability measurement at a relative humidity of 85% were performed with an Ox-Tran Twin instrument from Mocon, while the measurement at a relative humidity of 0% were performed with an L100 instrument from Lissy.

5.2 Experiment according to US No. 5.763,095:

A film with the same layer structure as described in the experiment 5.1 was produced as described in experiment 5.1.

The thickness of the individual layers of the total film was as described in experiment 5.1 as well as the materials used for the individual layers with the exception of the ratio of the two polymer components in the blend for the O₂-barriere layer c).

For layer c) as mixture of EVOH with 44 mol % ethylene as in the experiment 5.1 and a multipolyamide as in experiment 5.1 in a ratio by weight of EVOH to multipolyamide of 20:80 was used.

The O₂ gas permeability values at the different relative humidities were measured as described in experiment 5.1. The values are set forth in table1.

Table 1:

barriere layer of EVOH: multipolyamide weight ratio	23 °C, 0% rel. humidity, specific oxygen permeability [ml/m ² x d x bar]	23 °C, 85% rel. humidity, specific oxygen permeability [ml/m ² x d x bar]
30:70	644	544
20:70	738	880


Multipolyamide = polyamide BM 17SBG from EMS Chemie AG

6. Results:

From the experiments according to item 5. of the present declaration it is evident that surprisingly by incorporating a barriere-layer built of a mixture of EVOH (ethylene/vinylalcohol copolymer) and of a multipolyamide in the weight ratio of 30:70 the oxygen permeability is largely independent of an increase of the relative humidity whereas the oxygen permeability is increased at higher relative humidity considerably if the weight ratio of said mixture used to built a barriere-layer is lowered to 20:70 (EVOH: multipolyamide) as disclosed in US No. 5,763,095.

7. All statements made herein of my own knowledge are true, and all statements made on information and belief are believed to be true, and further, these statements were made with the knowledge that willful false statements and the like, so made, are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the U.S. Patent application serial no. 10/523,130 or any patent issued thereon.

Remig, 13.11.2008
(Date)


(Bernig, Walter)